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TECHNOLOGY DEPT.

SCIENCE NEWS LETTER

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THE WEEKLY SUMMARY OF CURRENT SCIENCE • FEBRUARY 2, 1946

Contact with the Moon

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A SCIENCE SERVICE PUBLICATION

ELECTRONICS

Escaped Radio Waves

They are constantly being sent beyond the atmosphere that surrounds our earth, but have only recently been reflected back to us.

➤ RADIO WAVES are constantly being sent beyond the atmosphere that surrounds our earth, but only recently have any of these "escaped" impulses been reflected back to us.

The SOS of a ship in peril on the sea, the messages with which far-away adventurers at the ends of the world keep in reassuring touch with those at home, and the globe-encircling signals of radio amateurs and professionals are all made possible by reflection from ionized layers, consisting of electrified particles, many, many miles above the tallest transmitting tower.

When a transmitting station sends out a series of radio signals, the energy goes in two ways, which may be described as the ground wave and the sky wave. The ground wave travels along the surface of the earth, gradually becoming less powerful as it spreads out over a greater area and as energy is absorbed from it.

Meanwhile, the sky wave travels upward until it reaches the ionized layer of the atmosphere and then is reflected back in much the same manner that light is reflected from a mirror. A receiving station located only a short distance from the transmitting station will pick up the signal first from the ground wave, and then after an interval as an "echo" from the sky wave.

A clue to the height of the ionized layer is given by clocking the time needed for a wave, which is assumed to travel with the speed of light, to hit the ionized layer and be reflected back. Reflection of waves from the ionosphere was in a sense the first radar.

Whether radio waves will be reflected by the lower ionized layer about 40 or 50 miles up, or whether they will penetrate it and continue up to some greater height and be reflected by one or another of the higher layers, depends upon the frequency or wavelength of the impulse. The greater the frequency or the smaller the wavelength, the higher will the radio impulse penetrate into the ionosphere and the longer will be the time interval before the echo returns. There is, however, no echo for some extremely small waves, which pass beyond all the layers and escape into space.

The maximum frequency which will be reflected by each layer, called the critical frequency for that layer, varies with the time of day, season of the year, longitude and latitude, and also with solar activity as shown in the sunspots.

In experiment stations throughout the world radio experts many times each day send into the upper atmosphere a wide range of radio waves to find the critical frequencies of the different layers. This information is used to suggest the best frequency for short-wave broadcasts.

To date, none of these short radio waves, escaping through the ionized layers surrounding the earth, have been known to hit a body in space and be reflected back to us. It took radar waves, specially beamed to the moon, to escape through the earth's atmosphere and return. Although scientists have long suspected that short radio waves did penetrate beyond the ionosphere, it was the moon that gave us our first definite proof.

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ELECTRONICS

"Blind Navigation" Possibility of Future

➤ SHIPS AND AIRPLANES of the future may use "blind navigation" to know where they are, regardless of the weather, by using radar to take their "sights" on heavenly objects.

Discovery that the layer in the atmosphere that ordinarily reflects radio waves back to earth, can be penetrated by radiation of 112 megacycles, makes it possible to pick up any heavenly body within range of the radar impulses.

A rotating antenna sweeping across the heavens could locate a planet in a way similar to that used during the war to pick up enemy ships, planes and submarines. The height and direction at which the planet is found would tell the navigator exactly what his position is on the surface of the earth.

When used for spotting of ships or other objects on the surface of the earth, the range of radar is limited by the horizon. Radar, like your eyes, can "look" only in a straight line and so cannot see around the curve of the horizon except by reflection. Putting the antenna on the top of a tall tower helps to see farther just as sending a lookout to the top of the ship's mast helps him to see farther.

But the horizon does not limit range when you are sending your radar message to the heavens. The only thing that limits range is the strength of the impulses. You could use radar to sight on the farthest star provided your antenna were sensitive enough to pick up the faint echo that comes back.

For "blind navigation" through dense clouds it would be necessary to work with a wavelength that will penetrate thick layers of moisture. Some wavelengths are screened off by heavy clouds. However, it should be possible to find a wavelength that will go through them. There may also be an engineering problem involved in making the necessary sending and receiving apparatus compact and light enough to be carried on a ship or a plane.

The navigator who makes use of radar will have to learn to take his bearings from objects he has not been using in the past. The bright stars used in ordinary navigation are extremely distant, and it would take years or centuries for the echo to come back. For radar navigation, it would be better to sight on the moon, the sun or the planets, which are only seconds distant, as radar-waves fly.

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AERONAUTICS

High-Flying Data Win Octave Chanute Award

➤ THE OCTAVE Chanute award for 1945 was presented at the victory dinner on Jan. 28 of the Institute of the Aeronautical Sciences in New York, to Robert T. Lamson and A. Elliott Merrill for obtaining at great personal hazard data contributing to the design of high-altitude military aircraft. Specifically, their flight research contributed to the success of high-altitude, daylight precision bombing with B-17 airplanes in Europe.

The award is in honor of Octave Chanute, an engineer who gave assistance to the Wright Brothers in their early work.

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Starfish are a pest in commercial oyster beds; one has been known to eat more than 50 oysters in six days.

ELECTRONICS

Echoes Off The Moon

Specially designed radar was used in the contact with the moon. Pulses of high frequency were shot into space and their echoes were detected seconds later.

See Front Cover

➤ MAN HAS actually contacted the moon. Radio waves, according to the War Department, have gone beyond our atmosphere to the moon and been reflected back to us, travelling an estimated 477,714 miles in all.

This first contact with the moon was made on Jan. 10 by Army Signal Corps scientists at the Evans Signal Laboratory, Belmar, N. J. Specially designed radar was used which shot pulses on very high frequency energy out into space and detected their echoes seconds later. The picture on the front cover of this SCIENCE NEWS LETTER shows the antenna used by the Army Signal Corps to make the contact with the moon.

Announcement of this first proof that radio waves can penetrate beyond the earth's atmosphere was withheld until the Signal Corps was certain beyond doubt that the experiment was successful. The results achieved have been painstakingly verified. Several subsequent efforts to contact the moon have also been successful.

Radar pulses, like radio waves, travel at the speed of light—186,000 miles a second. It took about 2½ seconds for the radar pulses to speed from the station to the moon and the echoes to travel back to the station. The distance between the moon and the earth, which varies as the moon revolves and moves in its orbit around the earth and they together travel around the sun, is calculated to average about 238,857 miles.

The Signal Corps experiments are expected to have "valuable peacetime as well as wartime applications." One obvious possibility is the radio control of long-range jet—or rocket-propelled missiles, circling the earth above the stratosphere. The German V-2 missiles already are believed to have reached an altitude of 60 miles.

Radar might eventually be developed to the point where it can be used by astronomers to map the surface of the moon far more accurately than is at present possible. Radar may also help in constructing detailed topographical maps of distant planets and in definitely determining whether life, such as we know it, exists on any of them. It might conceivably be used in getting data concerning the composition and atmosphere of other celestial bodies.

The primary significance of the Signal Corps achievement is that this is the first time scientists have known with certainty that a very high-frequency radio wave sent out from the earth can penetrate the electrically charged ionosphere.

In connection with wartime applications of radar, the Signal Corps has been studying for several years the problem of reaching other celestial bodies with radar. The experiments were directed by Lt. Col. John H. Dewitt, Jr., former director of the Evans Signal Laboratory.

The equipment used for this experiment comprised extensive adaptations to a standard wartime Signal Corps radar, originally designed in 1937 for long-range early warning against enemy air attack.

The radar was operated at its standard frequency of 112 megacycles—its alternating-current radio waves made 112,000,000 complete cycles per second—but the pulse repetition rate and pulse width were extended beyond the usual standards. Instead of sending out several thousand spaced pulses each second the modified radar transmitted a pulse only every five seconds. The pulse width was increased from a few billionths of a second to as much as one-half second.

A specially designed high persistency oscilloscope, comparable to the "A-scope" used on wartime radars, was constructed to present visual evidence of the moon echoes. When the radar was operating, a line across the face of the tube represented the transit of the successive pulses. As each pulse left the transmitter, a tall "pip" appeared at one end of this line. A smaller pip, toward the other end of the line, represented the pulse echo received from the moon.

A double-sized antenna with 64 instead of the standard 32 dipoles on a 100-foot tower was used.

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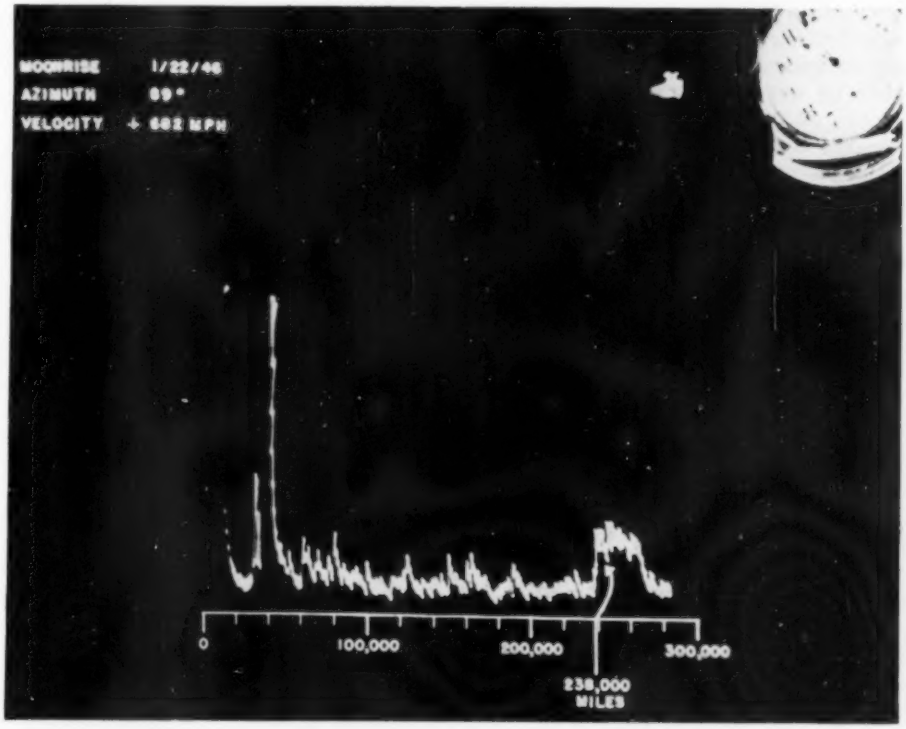

RADAR SCOPE—Shows the start of the impulses toward the moon and their reflection from it. Between the start and finish of impulses is a three-second interval, with contact made after two and a half seconds. First upswing (left) of the line indicates start, while tiny pips are the result of minor interferences. Photographs by Acme.

ELECTRONICS

Outer Space Radio Hiss

Cosmic hiss first radio impulses received from outer space in 1932. Radio mystery antedated radio echoes from moon by over dozen years.

➤ THE RADIO WAVES bounced off the moon in the Army's radar experiments are not the first radio waves to arrive on earth from outer space.

There is a cosmic radio hiss that seems to originate in the stars of the Milky Way or in interstellar space which Karl G. Jansky, Bell Telephone Laboratories engineer, discovered in 1932 while working with an extremely sensitive receiving set. This Milky Way static is probably the first radio impulse received from outer space, although the moon-reflected radar signal is the first man-made radio signal to be received on earth after a travel in outer space.

The origin of this cosmic hiss is one of the problems of science that need to be solved in the future. Probably the best suggestion as to its origin is that it is black-body radiation from the stars or from matter in interstellar space. This idea, which means that the stuff in the stars act somewhat like a radio transmitting tube, was put forth by Mr. Jansky when he was still working on the phenomenon some years ago before war research absorbed his time and energies. At present, Mr. Jansky, who was interviewed while attending the meeting of the Institute of Radio Engineers, is doing research for the microwave repeater systems such as that being installed by American Telephone and Telegraph Co. between New York and Boston.

The interstellar static impulses are not on any one frequency but seem to be spread up and down the radio spectrum. Mr. Jansky's original experiments were with a radio set tuned to about 200 megacycles. Grote Reber, experimenting near Chicago, has reported in the *Astrophysical Journal* during 1945 cosmic radio impulses received on 300 and 600 megacycles.

Radio engineers have been confident that radio waves travel into outer space because some radio signals are not reflected by the ionosphere layers and since they did not bounce back to earth they must have gone out into outer space.

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ORDNANCE

VT Fuze Closely Guarded

➤ THE PROXIMITY fuze was one of the war's really secret "secret weapons"; even at the close of hostilities the military chiefs of enemy countries had not found out about it.

That it was one of the war's two best-kept big secrets (the other being the atomic bomb) was due in large measure to the careful precautions taken to keep any specimens from falling into enemy hands, in shells or bombs that failed to explode. These security measures are outlined in a general discussion of the fuze by Col. Harold S. Morton, who has worked on the fuze since 1941. (*Army Ordnance*, Jan.-Feb.)

Navy shells carrying the proximity fuze, or as it is at once more technically and more briefly known, the VT fuze, were fired at enemy aircraft only over the water; the shells were never used against enemy surface craft, and they were not used against shore targets until the closing months of the war.

Anti-aircraft batteries on land used VT-fuzed shells only when their targets were above ground totally controlled by Allied forces. For example, when the secret of Hitler's planned V-1 buzz-bomb leaked to British information services, a special VT fuze was designed for use against it, in American 90-millimeter and British 3.7-inch rifles. The firing, done entirely from British soil, was highly effective against the Nazis' jet-propelled robot weapons, but there was never a chance of even a fragment of one of the fuzes falling into Nazi hands.

In the meantime, it had become increasingly apparent that the fuze would be highly effective against ground targets such as enemy troops, batteries and communications centers. Fuzes for field gun ammunition were designed and built in large numbers, but they were allowed to accumulate in strategic reserves until some occasion should arise when they could be used with greatest effect.

This occasion came at the famous Battle of the Bulge, the Nazis' last desperate bid for victory. Artillery using shell fuzed with VT's made their fire four or five times as effective as it would have been with older-type fuzes. Still the Germans failed to "get wise"—so that the inspired writer of the first report on their full use titled his opus, "They Never Knew What Hit Them."

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Utah, or desert, juniper, *Juniperus utahensis,* is the most abundant and widely distributed tree of the Great Basin from Idaho and Wyoming south into Arizona; it grows in dry, rocky, gravelly and sandy soils.

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GENERAL SCIENCE-EDUCATION

Science Talent Winners

Eleven girls, 29 boys are invited to Washington to attend the Science Talent Institute. Will receive scholarships totaling $11,000.

➤ ELEVEN GIRLS and 29 boys have been invited to Washington, March 1 through March 5, to compete for the Westinghouse Science Scholarships in the Fifth Annual Science Talent Search conducted by Science Clubs of America, administered by Science Service. They will spent five days together at the Science Talent Institute in Washington.

The names of the trip winners were announced by the judges as the result of a strenuous competition in which superior seniors of all secondary schools in the United States were invited to participate. The 40 winners were selected from about 16,000 entrants. About 3,000 of these students completed a science aptitude examination, submitted recommendations and scholarship records and wrote an essay on "My Scientific Project."

The trip winners come from 34 localities in 15 states and the District of Columbia. Entries were received from every state in the union.

Those who come to Washington for the Science Talent Institute in March on the all-expense trips, will compete for scholarships which will allow them to go to any college, university or technical school of their own selection to continue science or engineering training. One boy and one girl will be awarded $2,400 Westinghouse Grand Science Scholarships ($600 a year for four years), while 8 winners will be awarded $400 Westinghouse Science Scholarships ($100 a year for four years), and $3000 more in Westinghouse Science Scholarships will be awarded at the discretion of the judges.

Selected without regard to geographic consideration, the results show that this year winners come from two states that have not had winners before. Colorado and Washington have winners this year for the first time. This brings the total of states that have had winners to 32.

Only three schools in the United States have produced more than one winner this year. They are: The Bronx H. S. of Science, New York, N. Y., which will send four boys to the Science Talent Institute; Forest Hills H. S., Forest Hills, N. Y., and Andrew Jackson H. S., St. Albans, N. Y., each sending one boy and one girl.

Seven schools have been able to repeat winners. The Bronx H. S. of Science, New York, N. Y., leads, having had three winners in two previous years. Next is Taylor Allderdice H. S., Pittsburgh, Pa., which has produced two winners in two previous years. The following have all had a winner in a previous year: Bassick H. S., Bridgeport, Conn.; Southwest H. S., St. Louis, Mo.; Forest Hills H. S., Forest Hills, N. Y.; Whitesboro H. S., Whitesboro, N. Y.; Eugene High School, Eugene, Oreg.

Most of the winners live at home and attend their local or nearby public or parochial high schools. One, however, is enrolled in a private school and goes to school in Indiana. His home is in Oak Park, Ill.

About 67% of the 40 Science Talent Search trip winners rank first or second in their graduating classes, which range in size from 20 to 848 students. About 15% of the winners have parents who both attended college.

Most of the winners are members of science clubs and at least ten of them are presidents or hold other offices in their clubs. The total number of clubs in which they work is 50; of these 31 are affiliated with Science Clubs of America.

Many of the winners have chosen their fields of science study. Their choices range from astronomy to aeronautical engineering. Seven would prefer to get into biological fields such as medicine, pathology and surgery. Twelve are choosing to enter chemistry for research or engineering. A number want to be astronomers and others have chosen careers in physics, mathematics and engineering. All hope to do research in their chosen fields.

For the first time two winners in one family have been named. Douglas Baird of Whitesboro, N. Y., is the brother of Joan Audrey Baird, winner in 1944.

The judges of the Science Talent Search are: Dr. Harlow Shapley, director of the Harvard College Observatory and President of Science Service; Dr. Harold A. Edgerton, director, Occupational Opportunities Service, Ohio State University; and Dr. Steuart Henderson Britt, New York City psychologist. The latter two are the designers of the Science Aptitude Examination made each year expressly for the Science Talent Search.

In addition to the 40 winners of trips to Washington for the final competition for the Westinghouse Science Scholarships, 260 boys and girls will be named for honorable mention in the Fifth Annual Science Talent Search. They will be recommended to colleges and universities for their science aptitude and, if they are as fortunate as those previously named for this honor, they will receive offers of scholarships from many schools and colleges seeking talented students.

Previous winners of the Science Talent Search total 160. Most are now students in colleges and universities where they are preparing themselves for scientific careers. Six have already received undergraduate degrees. One is the holder of two degrees at age 20. At present 59 are serving in the armed forces—12 of them in occupation areas.

The annual Science Talent Search is conducted by Science Service as one of the activities of Science Clubs of America. Awards are provided and the Science Talent Search made financially possible by the Westinghouse Electric Corporation, a leader in scientific research, engineering and manufacture in the electrical industry, as a contribution to the advancement of science.

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ZOOLOGY

Returning Soldier Brings Wallabies, Geese, Rooks

➤ WALLABIES, hedgehogs, badgers, jackdaws, rooks, rare geese and pheasants accompanied Sgt. Frederick A. Ulmer, Jr., on his recent return from London. Sgt. Ulmer, a life member of the Zoological Society of Philadelphia and a member of the staff of the Academy of Natural Sciences, had special permission from the U. S. Army to make the trip with the hundred or so mammals, birds and reptiles, and deliver them safely to the Philadelphia Zoo.

The animals, shipped from the London Zoo, were in exchange for a group of animals sent from Philadelphia to England to help replenish the display in the Regent's Park Zoo. Much damage was caused in the famous London institution during the blitz and the buzz-bomb attacks.

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GENERAL SCIENCE-EDUCATION

260 Honorable Mentions Awarded in Science Search

➤ HONORABLE MENTIONS to 192 boys and 68 girls in the Fifth Annual Science Talent Search for the Westinghouse Science Scholarships have been announced by Science Clubs of America, bringing to 300 the high school seniors cited in this nation-wide selection of youth who have scientific ability.

The 260 awarded honorable mentions are located in 36 states and the District of Columbia. They were chosen from among some 16,000 entrants, about 3,000 of whom completed the science aptitude examination, submitted recommendations and scholarship records and wrote essays on the subject, "My Scientific Project."

All of those selected for honors will be recommended as students of unusual ability to scholarship-awarding colleges and universities.

The honorable mentions in the four previous Science Talent Searches were awarded and earned scholarships amounting to more than $200 each and there is every reason to believe that the boys and girls so honored this year will qualify for valuable scholarships and other financial assistance in the colleges, universities and technical schools of their choice. The judges found all 300 winners to be students of outstanding ability.

Among the honorable mentions 50% of the boys and 45% of the girls were first or second in their high school graduating classes. They have studied science for some years: 40% of the boys have had at least four years of high school science and 28% of the girls have studied science for a similar period. A larger number have studied science for three years: 41% of the boys; 41% of the girls.

All the honorable mentions have crowded records of extra-curricular activities. Science clubs are among the more popular activities: 156 of them belong to science clubs and 53 of them are presidents of their clubs or hold other elective offices in them.

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Until the time of Henry VIII, according to reports, *vegetables* were not cultivated for the table.

By capturing *bees* returning to their hives and stripping them of pollen collected, scientists are learning the kinds of plants the bees visited and which they prefer.

GENERAL SCIENCE-EDUCATION

40 Winners Listed

The 11 girls and 29 boys (proportion determined by ratio of boys and girls entering the contest) are being invited on all-expense trips to Washington, D. C., March 1 to 5, 1946, to attend the Science Talent Institute, where one boy and one girl will be awarded $2,400 Westinghouse Grand Science Scholarships, eight winners will be awarded $400 Westinghouse Science Scholarships, and $3,000 additional in scholarships will be awarded.

	CALIFORNIA
Alameda	Roemer, Elizabeth 16 Alameda High School
Los Angeles	Hummel, James Alexander 17 Alexander Hamilton High School
Mill Valley	Jones, Elaine Carlota 16 Tamalpais Union High School
Napa	Cudaback, David Dill 16 Napa Junior College
San Francisco	Shields, James William 16 St. Ignatius High School
	COLORADO
Boulder	McMillin, Patricia Ruth 17 Boulder High School
	CONNECTICUT
Bridgeport	Zirin, Harold 16 Bassick High School
Hamden	Gaines, George Loweree, Jr. 15 Hamden High School
	DISTRICT OF COLUMBIA
Washington	Hopkins, John Taylor, IV 17 Roosevelt High School
	ILLINOIS
Chicago	Kohnen, Dorothy Margaret 17 Immaculata High School
Downers Grove	Larson, Daniel Herbert 15 Downers Grove Community High School
Granite City	Johnson, Russell Dee, Jr. 16 Granite City Community High School
	INDIANA
Culver	Arnold, Stephen Reynolds 17 Culver Military Academy
	KANSAS
Medicine Lodge	Kindig, Neal Bert 17 Medicine Lodge High School
Wellington	Champeny, John Charles 16 Wellington High School
	MINNESOTA
Brainerd	Widing, Kenneth Gordon 18 Washington High School
	MISSOURI
St. Louis	Kernen, Jules Alfred 16 Southwest High School
	NEW JERSEY
Garfield	Gall, Walter George 16 Lincoln High School
Upper Montclair	West, Robert C., Jr. 17 State Teachers College High School
West Orange	Newkirk, Gordon Allen, Jr. 17 West Orange High School
	NEW YORK
Forest Hills	Lewontin, Richard Charles 16 Forest Hills High School
	Raskind, Josephine Baron 16 Forest Hills High School
New York	Bush, Leon Reginald 16 Bronx H.S. of Science
	Durell, Jack 17 Bronx H.S. of Science
	Schweid, Abraham Isaac 17 Bronx H.S. of Science
	Sicular, Arthur 17 Bronx H.S. of Science
	Ludwig, Gerald Wilbur 15 Christopher Columbus High School
Poughkeepsie	Sack, Seymour 16 Poughkeepsie High School
St. Albans	Cumming, James Burton 17 Andrew Jackson High School
	Karasz, Ilonka 16 Andrew Jackson High School
Syracuse	Lines, Joan Louise 17 Nottingham High School
Whitesboro	Baird, Douglas Page 16 Whitesboro Central High School
	OKLAHOMA
Tulsa	Herbert, Donald Edmonds, Jr. 17 Will Rogers High School
	OREGON
Eugene	Kingman, Alice May 17 Eugene High School
	PENNSYLVANIA
Elizabethtown	Rohrer, E. Marilyn 17 Elizabethtown High School
Pittsburgh	Shombert, Donald James 17 Taylor Allderdice High School
Villanova	Laufer, Elizabeth Ursula 17 Notre Dame Academy
	WASHINGTON
Blaine	Seely, Gilbert Randall 16 Blaine High School
Ellensburg	Gibson, James Benjamin 17 Ellensburg High School
	WEST VIRGINIA
South Charleston	Jackson, Dorothy Jean 16 South Charleston High School

CHEMISTRY

DDT Has New Competitor

Claimed to be even deadlier to some species of insects, it is a compound described as a chlorinated hydrocarbon, named Velsicol 1068.

➤ DDT HAS a new competitor in the insect-killing business, claimed to be even deadlier to some species. It is a compound described as a chlorinated hydrocarbon, to which the trade name Velsicol 1068 has been given. The number 1068 affords a hint as to its composition: it contains 10 atoms of carbon, six of hydrogen and eight of chlorine to the molecule, giving it the empirical formula $C_{10}H_6Cl_8$. This of course gives no clue to the actual structure of the molecule, for the same assortment of atoms could be arranged in many different ways.

The new insecticide was compounded in the laboratories of the Velsicol Corporation of Chicago, which will manufacture and market it as an ingredient for sprays, insecticidal paints, etc. Laboratory and field tests on a limited number of insect species have been conducted by three entomologists, Prof. C. W. Kearns and Prof. Lester Ingle of the University of Illinois, and Robert L. Metcalf of the Tennessee Valley Authority.

Prof. Kearns states that the new compound has been found from three to four times as toxic to houseflies as DDT, twice as toxic to potato beetle larvae and to pea and spiraea aphids. It was about equal to DDT and the British insecticide known as Gammexane in its deadly effects on the "wigglers" of the most common of the malaria-carrying mosquitoes *Anopheles quadrimaculatus*.

Precisely measured dosages of 1068 and DDT applied externally to adult American cockroaches revealed 1068 to be approximately three times more toxic than DDT to this particular insect, Prof. Kearns continues. Measured quantities fed to adult grasshoppers indicated that 1068 is between five and 10 times more deadly, weight for weight, than DDT; also that it is from two to four times more poisonous to grasshoppers than Gammexane.

Volatility tests showed that 1068 is intermediate between Gammexane and DDT in its evaporation rate, so that it can be expected to last longer than the British poison but not so long as DDT when used in paints or as a residual spray.

Thus far, Prof. Kearns adds, "little information has been obtained as to the effect of 1068 on plants and animals other than insects."

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GENERAL SCIENCE-EDUCATION

AAUW Study Grants

Girls who led underground forces, helped resistance movement in Nazi-occupied countries now studying in United States with AAUW aid.

➤ A YOUNG WOMAN leader of underground forces in Norway during the Nazi occupation, another who aided refugees escaping to Sweden, a third who secretly taught classes in astronomy after the Nazis forced the University of Brussels to close, are among six young women now studying at colleges and universities in this country with aid from the International Study Grant program of the American Association of University Women in Washington, D. C.

Most dramatic of the stories of these young women told by the AAUW is that of 25-year-old Miss Anne Sofie Oestvedt, who is now studying the chemistry of foods at the University of California at Berkeley, preparing to do much-needed nutrition work in Norway.

Miss Oestevedt was second in command of 3,000 underground workers in Norway. She was hunted so intensively by the Germans that she had to take on a disguise so complete that her own father, standing next to her in a street car, did not recognize the young brunette as his former blonde daughter.

Hiding from the Germans since 1942, Miss Elsa van Dien, of Holland, nevertheless continued her scientific studies and was able to complete most of her thesis. Now enrolled at Radcliffe College, she is studying astronomy at Harvard Observatory and fulfilling the hope she never gave up of "joining USA student life." She had been awarded a fellowship to study in the United States in 1939 but could not accept it because of the outbreak of the war.

Also a student at Radcliffe and Harvard Observatory is Miss Simone Daro, of Belgium, who taught classes organized secretly by the underground after the University of Brussels closed.

Miss Karen M. Dannevig was another candidate chosen from among forty Norwegian applications for AAUW Study Grants. When occupation by the Germans interrupted her work at the University of Oslo, she worked first with the secret military organization in arranging the flight of refugees to Sweden and allowed her rooms to be used for instructing refugees, thus risking arrest and confiscation of her belongings. When her rooms were finally taken by the Gestapo, she worked as a coder of secret messages and as secretary to the leader of the Norwegian Home Forces. She is now studying American literature and history of the arts at Radcliffe College, preparatory to teaching English.

When an AAUW Study Grant was given to Miss Elizabeth Jansma of Holland last fall, the U. S. Ambassador to the Netherlands helped her to get passage to this country as the only passenger on a Liberty Ship. Her father, a well-known liberal, was one of the first group arrested by the Germans. A graduate of a "gymnasium" for girls, Miss Jansma is enrolled at Sweet Briar College, Virginia.

Miss Cecile Rabut of Paris, France, who has been a practicing advocate since graduating from the law school of the University of Paris, received the AAUW Study Grant to make a study of the problems of juvenile delinquency as handled by courts and correctional agencies in this country. After study at the New York School of Social Work, she will observe American methods in juvenile courts and institutions in the South and Middle West, under a schedule planned by the U. S. Children's Bureau. She will report to French authorities upon her return with a view to helping solve problems of delinquency which have reached alarming proportions in France.

The American Association of University Women will bring another group of women students to the United States next fall.

Science News Letter, February 2, 1946

GENERAL SCIENCE

GI Collectors Benefit U. S. National Museum

➤ SOUVENIR-HUNTING, the mark of American GIs everywhere, sometimes serves a more serious and permanent purpose than just collecting miscellaneous trophies wherewith to impress the girlfriend and the folks back home. At the annual meeting of the Smithsonian Institution's board of regents in Washington, D. C., Dr. Alexander Wetmore, secretary of the Institution, reported on substantial and valuable additions that have been made to the scientific collections of the National Museum by members of the armed forces serving overseas, especially in Asia and the Pacific area.

Some of the small mammal specimens sent in from the Indo-Pacific region are of species hitherto unrepresented in the Museum. A collection of nearly 600 birds came from Panama, 500 from Ceylon and about 100 from the Admiralty islands. Most important of the year's insect accessions was the large amount of mosquito material received from various units of the Army and Navy.

Among the Museum's wartime acquisitions in the field of cultural anthropology was a large model of an outrigger canoe from Tarawa and a royal Hawaiian cape made of red, yellow and black feathers. Gen. H. H. Arnold deposited on loan an Arab costume presented to him by the King of Saudi Arabia.

Outstanding among new engineering exhibits will be the first jet-propelled airplane built and successfully flown in the United States.

Dr. Wetmore announced the initiation of plans for the celebration of the hundredth anniversary of the Smithsonian Institution, which will be held next autumn.

Science News Letter, February 2, 1946

LANGUAGE

New Book Bridges Gap Between English and Aleut

➤ A NEW BOOK, titled *The Aleut Language*, which bridges the gap between English and the language spoken by the native of the Aleutian islands, has been published under sponsorship of the Department of the Interior. It contains a grammar and an English-Aleut vocabulary. The familiar Roman alphabet is used, but markings of some of the letters required the casting of a certain amount of special type.

Although newly published, the book is in some respects old. First work leading to its appearance was done between 1820 and 1830 by Ivan Veniaminov, a scholarly Russian priest. The rest of the work was carried out by the late Richard Henry Geoghegan, noted Irish linguist and philologist, and Miss Fredericka I. Martin of New York, who inherited Mr. Geoghegan's mass of source material upon his death in 1943, and who edited the final text.

Science News Letter, February 2, 1946

AERONAUTICS

Guggenheim Medal Awarded Dr. T. P. Wright

➤ THE DANIEL Guggenheim medal for 1945, and also an Honorary Fellowship in the Institute of the Aeronautical Sciences, were presented by the institute on Jan. 28 to Dr. T. P. Wright, U. S. Administrator of Civil Aeronautics.

The medal is awarded him for outstanding contributions to the development of civil and military aircraft and for notable achievement in assuring the success of the wartime aircraft production program. The fellowship is regarded as one of the highest honors the institute confers on persons of preeminence in aeronautics.

Science News Letter, February 2, 1946

CHEMISTRY

Process for Extracting Dandelion Rubber

➤ ALTHOUGH the end of the war has reduced the likelihood of our needing to rely on home-raised rubber-yielding plants, patent 2,393,035 has been granted to two U. S. Department of Agriculture scientists, R. E. Eskew and P. W. Edwards, at the Eastern Regional Research Laboratory in Philadelphia, on a simplified method of extracting rubber from the roots of the Russian dandelions, koksaghyz and tau-saghyz. The roots are first leached of their carbohydrates with hot water, then mill-crushed to a pulp or slurry, in which the rubber particles agglomerate into relatively large masses. The slurry is then diluted and screened, and the rubber and adhering skins remaining on the screens are scrubbed with water. The resulting slurry is then dispersed in water and the floating rubber removed while the debris sinks.

Rights in the patent are assigned royalty-free to the government.

Science News Letter, February 2, 1946

IN SCIEN

BIOCHEMISTRY

Vitamins from Manure Seen as Possibility

➤ CHICKENS scratching on a manure pile may not be the most fastidious eaters in the world, but at least they have found out how to stay healthy, results of experiments at the Colorado A and M College indicate. Chicks fed on a normal ration did not grow as rapidly or mature as soon as those fed on a similar ration to which 10% of dried manure was added.

Biochemists at the college are now engaged in a comprehensive research program to find out what vitamins, hormones and other "trace substances" important to the health of farm animals may be in the wastes from their own bodies. It has already been discovered that the manure of pregnant cows contains a high concentration of male sex hormone.

Science News Letter, February 2, 1946

AERONAUTICS

B-29 Superfortress Beats Endurance Record

➤ WHAT IS believed to be an endurance record for stratosphere flight by an airplane was made recently by a B-29 Superfortress that remained at an altitude of over 40,000 feet for three hours and 38 minutes. Announcement of this record was made by the Army Air Technical Service Command at Wright Field, Ohio.

The Superfortress used was especially equipped as a pressurized flying laboratory, and scientists aboard accumulated much data which will be of use to aviation engineers in designing high-flying planes, and which are to be made available to the aircraft manufacturing industry as a whole.

The record was made in conjunction with high-altitude flights being conducted by the Boeing Aircraft Company and the Air Technical Command to test various types of equipment for future stratosphere bombers. Previously a B-17 was used in these tests. The B-29 was substituted because it offers better operational conditions, and can be pressurized and heated to withstand the stratosphere.

Science News Letter, February 2, 1946

NCE FIELDS

BOTANY

Botanical Classic Now Published for General Use

➤ A GREAT but little-known work on plants, written in the late middle ages and threatened with loss to the world of science by World War II, has now been made generally available for the use of botanists through publication in modern book form. It is the *Herbal* of Rufinus, an Italian monk, who completed the manuscript near the close of the thirteenth century.

The original manuscript is lost, and only one copy, made at least a century after the first writing, survives in the Laurentian Library at Florence—that is, it is still there if mishaps of the late war did not destroy it. A photographic copy was in the hands of a noted student of the history of science, Prof. Lynn Thorndike of Columbia University, before the war. He has edited it, and it has now been published by the University of Chicago Press.

Like all medieval and early modern herbalists, Rufinus concerned himself primarily with the medicinal values of his plants. But unlike other early herbalists, who took it for granted that everyone knew all plants at sight, Rufinus describes his species very exactly—so much so that present-day botanists can tell what plants he was writing about.

One thing stands in the way of easy use of the new Thorndike edition by all American botanists—the text is in the original Latin. However, medieval Latin, while less elegant than the classic language as written by Cicero and Vergil, is also less involved in its grammar. Anyone with a couple of years of high-school Latin should be able to read this book.

Science News Letter, February 2, 1946

AERODYNAMICS

German Supersonic Wind Tunnel Now in America

➤ A GERMAN supersonic wind tunnel for research in aerodynamics will soon be set up and used by the Navy at the Naval Ordnance Laboratory in White Oak, Md. Its parts were received late in 1945, and German scientists and engineers are being brought to this country to assist in its installation and initial operation. It was formerly used at the German Aerodynamic-Ballistic Research Establishment at Kochel, where work in the development of the Nazi V-weapons was carried on.

This wind tunnel is of unusual interest because, according to the Navy, it includes equipment that has never been duplicated outside of Germany. It includes the world's largest interferometer, which measures air density by optical means.

A total of 13 German scientists and engineers, experts in the field of aerodynamics and formerly associated with the Kochel establishment, are being brought to the United States under contract for a limited period. The Navy will furnish them with quarters and meals. Their salaries will be sent to their families in Germany. They will arrive under escort, and will be admitted to the country as disarmed aliens and not as prisoners of war.

Science News Letter, February 2, 1946

FISHERIES

Jap Oyster Invasion Threatens Eastern Coast

➤ WARNING against the dangers of a possible Japanese invasion of the Atlantic seaboard of the United States has been sounded.

No, this isn't February, 1942; it's still February, 1946. The Japs that may get into our seacoast waters if we don't watch out are the big Japanese oysters, already cultivated for commercial purposes on the Pacific coast. They're all right for those waters, for the Pacific coast didn't have any big oysters of its own, until seed oysters were imported from Japan and planted there some years before the war. New shipments of seed oysters are now expected from the same source, to replenish the beds.

However, the U. S. Fish and Wildlife Service warns Eastern oyster "farmers" against setting Japanese oysters in their beds. While the Oriental shellfish is acceptable in lack of a better, it is not the equal of the eastern American oyster in either flavor or appearance. Moreover, it is a veritable weed among oysters, and its prolific growth might drive out the native species; or it might ruin its quality by hybridizing with it.

Finally, Dr. Paul S. Galtsoff of the Service warns, the Japanese oyster drill, a predatory snail that is a deadly enemy of oysters, could easily be introduced into Eastern oyster beds, and if it is the effects will be ruinous.

Science News Letter, February 2, 1946

ASTRONOMY

Gives Direct Position Readings of the Stars

➤ A NAVIGATIONAL apparatus that requires no calculations on the part of the observer, and calls for no use of sextant or other "star-shooter," is the unique offering of Carl J. Crane of Sacramento, Calif., who has received U. S. patent 2,393,310 on his invention.

The device combines the principles of camera obscura and planetarium. It consists essentially of a closed chamber divided horizontally by a sheet of ground glass or other translucent substance. In the middle of the top is a lens combination that catches the images of star groups and projects them on the upper surface of the ground glass. Underneath is an internally lighted small sphere, pierced with pinholes in the positions of the principal fixed stars, and mounted with a set of graduated rings that permit settings for calendar date, chronometer time, etc. The pinhole points of light from the openings in the sphere are projected against the lower surface of the ground glass. When the actual star images from above and the artificial ones from beneath are in exact agreement, the position of ship or plane carrying the instrument can be read off directly on a final graduated circle.

Rights for manufacture and use are assigned royalty-free to the government.

Science News Letter, February 2, 1946

AERONAUTICS

Nylon Hoop Lands Planes on Tiny Islands

➤ NO ISLAND or area on the globe will be too small or remote for air transportation with use of the simple Brodie system for landing planes off the ground. The system, invented by Capt. James H. Brodie, permits small aircraft to land on ships only 300 feet long and on land where only a 500-foot treeless area is accessible.

During the Okinawa campaign liaison planes landed on small ships by hooking onto a nylon hoop suspended from a trolley cable stretched between two booms on the boat. Important reconnaissance, direction of naval fire, evacuation of wounded men, and replenishment of ammunition supplies were thus possible.

Landings may now be made not only on ships but on islands and in rugged areas where regular landing fields are impossible or too costly.

Science News Letter, February 2, 1946

MEDICINE

Medical Heroes

Members of the medical corps of all services, officers and enlisted men alike, won six per cent of all decorations for service beyond the call of duty.

By HILLIER KRIEGHBAUM

➤ THE MEN of mercy—the doctors and enlisted men of the medical corps—were heroes, too.

A survey of Army and Navy records today shows that when the awards and decorations were presented for acts of bravery during World War II, the medical men had matched and in some cases surpassed their comrades in arms.

In his final report on the war, General of the Army George C. Marshall said that 6% of all decorations given for meritorious service and gallantry went to medical department personnel. It was the same in the Navy.

For example, the Congressional Medal of Honor, highest award that a grateful nation can bestow on its wartime heroes, was given to six Army "medicos" and to three Navy corpsmen. That meant a total of nine out of the slightly less than 350 medals awarded for transcending heroism. This figure compares favorably with the proportion granted to the fighting men.

North and south, east and west—all sections of the country were represented by these elite of medical heroes. Some were farm boys who had never left their home communities except for brief excursions to nearby cities until they joined the armed services and were sent to distant battlefields. One had been a conscientious objector. And one, as if in answer to Noel Coward's facetious slur, came from Brooklyn, N. Y.

First to Win Honor

Lloyd C. Hawks, who came from Park Rapids, Minn., was the first from the medical corps to win the Congressional Medal of Honor. Then there was Harold A. Garman of Albion, Ill., who plunged into the Seine River through a hail of machine gun bullets to rescue three wounded men stranded in an assault boat; Thomas J. Kelly of Brooklyn, who ten times went through brutal machine gun fire to rescue wounded men of his unit; and Alfred L. Wilson, of Fairchance, Pa., who gave his life in an attempt to treat wounded infantry comrades under shell fire.

The bloody fields of Iwo Jima and Okinawa were the scenes for all three Navy incidents. Robert Eugene Bush, a 19-year-old Navy hospital apprentice, helped fight off a Japanese counterattack while giving a blood transfusion to an injured Marine officer in a shell hole. George Edward Wahlen of Ogden, Utah, continued through enemy gunfire repeatedly on Iwo Jima until, on March 2, he crawled to aid a fellow comrade despite his own injuries so serious he could not walk. John Harlan Willis of Columbia, Tenn., was killed when a Jap hand grenade exploded in his hand after he had hurled back eight others as he administered blood plasma to a wounded Marine in an Iwo Jima foxhole.

Two of the Army awards were won in the Pacific area. Desmond T. Doss of Lynchburg, Va., after repeatedly staying in fire-swept areas on Okinawa, crawled off a litter when wounded himself to aid a more seriously injured man. Laverne Parrish of Ronan, Mont., won a posthumous medal for bravery while administering to wounded soldiers in the Southwest Pacific.

The story of Hawks, who still was on crutches when the blue and white ribbon of the Congressional Medal of Honor was pinned around his neck, remains one of the thrilling dramas of the war. It is simply but eloquently told in his citation:

"On 30 January 1944 at 1500 hours (3 p.m.) near Carano, Italy, Private First Class Hawks braved an enemy counterattack in order to rescue two wounded men who, unable to move, were lying in an exposed position within 30 yards of the enemy. Two riflemen, attempting the rescue, had been forced to return to their fighting holes by extremely severe enemy machine gun fire after crawling only 10 yards toward the casualties. An aid man whom the enemy could plainly identify as such had been critically wounded in a similar attempt. Pfc. Hawks nevertheless crawled 50 yards through a veritable hail of machine gun bullets and flying mortar fragments to a small ditch, administered first aid to his fellow aid man who had sought cover therein and continued toward the two wounded men 50 yards distant. An enemy machine gun bullet penetrated his helmet, knocking it from his head, momentarily stunning him. Thirteen bullets passed through his helmet as it lay on the ground within six inches of his body.

"Pfc. Hawks crawled to the casualties, administered first aid to the more seriously wounded man and dragged him to a covered position 25 yards distant. Despite continuous automatic fire from positions only 30 yards away and shells which exploded within 25 yards, Pfc. Hawks returned to the second man and administered first aid to him. As he raised himself to obtain bandages from his medical kit his right hip was shattered by a burst of machine gun fire and a second burst splintered his left forearm. Displaying dogged determination and extreme self-control, Pfc. Hawks, despite severe pain and his dangling left arm, completed the task of

HIGHEST AWARD—During October President Harry S. Truman presented the Congressional Medal of Honor to PhM 2/c G. E. Wahlen, USNR.

REAL HEROES—These men received the highest award of our country for service beyond the call of duty. Top, left to right: Sgt. Thomas J. Kelly, Hospital Apprentice 1/c R. E. Bush, Pfc. Desmond T. Doss, AUS, Pvt. Harold A. Garman. Botton: Pfc. Lloyd C. Hawks, USA, received the Medal of Honor from the late President Roosevelt. Official U. S. Army and Navy photographs.

bandaging the remaining casualty and with superhuman effort dragged him to the same depression to which he had brought the first man. Finding insufficient cover for three men at this point, Pfc. Hawks crawled 75 yards in an effort to regain his company, reaching the ditch in which his fellow aid man was lying."

The 19-year-old Bush of Raymond, Wash., braved many artillery, mortar and machine-gun fire on Okinawa to administer to the wounded falling under murderous Japanese barrages. Despite a Jap counterattack, he continued to administer life-giving plasma to a wounded Marine officer.

Bush's citation tells the rest of the story as follows:

"With the bottle held high in one hand, Bush drew his pistol with the other and fired into the enemy's ranks until his ammunition was expended. Quickly seizing a discarded carbine, he trained his fire on the Japanese charging point-blank over the hill, accounting for six of the enemy despite his own serious wounds and the loss of one eye suffered during his desperate battle in defense of the helpless man.

"With the hostile force finally routed, he calmly disregarded his own critical condition to complete his mission, valiantly refusing medical treatment for himself until his officer had been evacuated and collapsing only after attempting to walk to the battle aid station."

While all the Congressional Medals of Honor were given to enlisted men of the medical corps, thousands of doctors have been cited for conspicuous bravery. Countless others performed their deeds of valor but went unrewarded with any award or decoration.

Army figures for the European theater of operations are the only ones now available in a formal report because those from the Pacific have been slower in being tabulated.

In addition to the Congressional Medals of Honor, this tabulation showed 97 awards of the Distinguished Service Cross, the Army's second highest medal for distinguished bravery; 217 of Legion of Merit and 2,849 of the Silver Star. The Bronze Star was the most frequent of the combat awards to the medical personnel with 13,779 going to enlisted men; 2,716 to officers and 322 to Army nurses. Clusters to the Bronze Star for additional valor were awarded to 1,117 individuals.

Army nurses received a total of 572 awards, including 237 Air Medals or clusters for bravery in the air. Seventeen nurses were awarded the Purple Heart; one was taken prisoner; and four were killed in action.

100 Navy Crosses

The Navy's figures are not expected to be completely tabulated for many months but an officer in the Bureau of Medicine and Surgery estimated that approximately 100 Navy Crosses had gone to doctors and corpsmen.

Doctors unwittingly were caught in the midst of battle as lines swung back and forth. An example from the dozens to pick from is the surprise dawn attack by Japanese down a road leading to the Third Marine Division hospital on Guam. Although the 25 Japs were flanked by snipers and machine gunners on the hillsides, they infiltrated toward the medical corps' tents. Despite rifle fire, the enemy charged, yelling, "Yip yip." Patients fled, clad only in brief hospital smocks or in blankets.

Surgeons were operating in the initial daylight when a Jap mortar ripped through their tent in the middle of the camp site. Lt.-Comdr. Clarence C. Piepergerdes, of Bisbee, Ariz., organized a group of pharmacist's mates and marines. He led them so effectively that the advance toward the hospital area was halted. The group held a defensive position on the right flank until division reserves could relieve this motley army.

When presented the Silver Star medal, Comdr. Piepergerdes received a citation which praised his action, which had "undoubtedly saved the lives of wounded patients, prevented panic, and inspired others who observed him."

Army counterpart of Comdr. Piepergerdes was Maj. Reuben K. Pliskin, an Akron, O., surgeon in civilian life, who was ordered to move his hospital group to the rear during the campaign on Mindanao. In his case, too, the Japs infiltrated through the American lines and overtook the caravan which had been held up by a destroyed bridge as it moved to a rear area. (*Turn to next page.*)

Do You Know?

Ginger is one of the few spices obtained from roots.

The *clove tree,* source of the well-known spice, is an island tree that is said to require salt air.

There are about 13 *penicillin-producing* establishments in the United States and Canada, representing an investment of some $20,000,000.

Small portable *turbine,* reported developed and in use in Russia, requires only about two cubic meters of water a second to operate and can furnish electric light for 600 homes.

A few of the *snowy owls* of the Arctic region visit northern United States each winter, but when food is very scarce thousands come south, sometimes as far as North Carolina.

When a jumping *spider* leaps from a perch, a safety line emerges from its spinnerets which hardens on exposure to the air; if it misses its objective, it can haul itself back to the perch by the line.

Electric plants under the U. S. Department of the Interior during the year ended June 30, 1945, generated nearly 9% of the total American output of electrical energy.

Pre-packaged fresh meats, fruits and vegetables will soon become common in food stores; protection against contamination, loss of weight, bruising and spoilage are promised by pre-packaging.

The *agate stone* logs found in the Petrified Forest in the southwestern United States were tree logs millions of years ago, into whose cell cavities and intercellular spaces silica in solution and other minerals entered.

Nitrogen, the chief growth-producing stimulant in the soil, is responsible for the hardy stem and leaf; with a lack of nitrogen, these characteristics are absent; with too much, the plant runs to foliage and not to fruit.

Spices are obtained from the buds, leaves, seeds, bark, roots and berries of tropical aromatic pungent plants; seasoning herbs are obtained usually from the leaves of temperate-zone annual or perennial plants.

Here is Maj. Pliskin's description of the encounter in which he received 14 bayonet and saber slashes:

"The Nips came down the road. We could see them faintly because of the burning truck. First we heard footsteps, then we could see them. About 15 feet away from me, a stream of fire came at me from the bank at the side of the road. I used my .45, and I guess I got the Nip. There were two more, one in front, one to the right. The one in front opened up, and I emptied my pistol at him. The third man attacked.

"I threw my pistol, probably stunned him, and we started to tussle. Then two more moved up, and began to jab at me with a bayonet as I struggled. The third stab cut my wind-pipe and I fell back. I don't know how long I was unconscious. When I came to, I rolled into the ditch, under the brush, I stuck a handkerchief into my face wound, and lay face down. The Nips came back, blowing up trucks. Five or six were burning, and the grass was afire. Luckily, the area around the truck nearest me didn't catch fire.

"About 1 a.m., our troops came back, and started to drive away the trucks that could still move. I yelled at them. They refused to come in, thinking I was a Nip and I had to crawl out. A corporal in my outfit recognized me. Our troops took care of me."

Even behind enemy lines, American medical men performed their life-saving duties. A Bronze Star medal went to Lt. Joshua P. Sutherland of Haysi, Va., for his work in the German Stammlager IX B Prisoner of War camp from December, 1944, to April, 1945.

Although entitled to live in officers' quarters after he was captured, Lt. Sutherland voluntarily remained at the enlisted men's camp when he realized that the Nazis did not intend to give sick and dying American enlisted men any medical attention. He was medical officer for some 3,000 men and had to work in filthy and louse-infected rooms.

When the Nazis planned to evacuate the camp's prisoners by forced marches, the doctor convinced them of dire consequences that could follow such a plan. Thus he delayed the proposed move long enough for United States troops to reach the camp and liberate the prisoners.

Science News Letter, February 2, 1946

METEOROLOGY

Typhoons Were Hunted

Data on position, course and violence of storms sent in by American airmen in the Pacific were of immense value in sea and air operations.

➤ AMERICAN AIRMEN flew out hunting typhoons, which rate as the world's worst weather, during the closing months of the Pacific campaign. When a typhoon was found it was tracked by these determined and daring weather scouts as if it were a hostile force—which indeed it was. Data on position, course and violence of the storm, radioed to island bases and fleets at sea, were of immense value in operations.

The daring work of these weather-chasing flyers, unpublicized during the war, has been made known by the Navy Department.

Three types of four-engined land-based bombers were used in the typhoon reconnaissance. They were all given extra fuel capacity to enable them to make flights of thousand-mile radius. No extra oxygen was carried, and flights were all made at low altitude—frequently hundreds of miles at less than 1,000 feet above the waves. Ditching and parachuting were out of the question because the water was always impossibly rough. And many of the flights had to be made over waters then dominated by the enemy.

Two kinds of operational flights were regularly made. One was a questing flight over a given course, searching wide areas for possible typhoon conditions. Once a typhoon was found in action, planes followed it regardless of area boundaries, keeping track of it day after day, until it had blown itself out. Half-hourly reports were radioed to the base, giving the plane's position and present weather. A full verbal report was given by the aerological observer upon return to base. All reports received urgent precedence and were rushed by radio to all commands operating near the storm.

Setting up typhoon reconnaissance as a regular Navy aviation job was determined upon as a result of rough experiences of American forces at sea and in

the air in a typhoon southeast of Okinawa on June 5, 1945. Regular flights, begun soon after that date, were continued until Nov. 15. In all, 345 such typhoon reconnaissance flights were made.

Weather research as well as weather scouting will become part of the flyer's job beginning in March, when Army and Navy air forces, under the scientific direction of the U. S. Weather Bureau, will fly remote-controlled, pilotless planes into the hearts of the worst thunderstorms they can find, to learn more about these storms, rated about worst of weather hazards that aircraft have to encounter in temperate regions.

The research will be conducted at the huge air installation of the Army Air Force at Orlando, Fla., and at the Naval Air Station at Banana River in the same state. The robot planes will carry instruments to record all that happens to them in their trouble-seeking flights, and they will be watched and controlled from "laboratory" planes flying at a safe distance from the dangerous thunderheads.

Several other organizations will collaborate, conducting research along special lines. Among them will be the National Advisory Committee for Aeronautics, the Soaring Society of America, the Massachusetts Institute of Technology, the University of Chicago and the University of New Mexico.

Science News Letter, February 2, 1946

CHEMISTRY

Vitaminized Fertilizer From Pulp-Mill Waste

➤ WEALTH from waste, always a fascinating topic in the annals of American industry, finds a new exponent in a New York inventor, Eric W. Eweson, who has been granted U. S. patent 2,392,811 on a fertilizer made by culturing masses of yeast cells in sulfite liquor, a most objectionable effluent from woodpulp and paper mills.

To prevent development of too much alcohol, Mr. Eweson bubbles quantities of air through the sulfite liquor while the yeast cells feed on the wood sugars dissolved in it, and on the mineral salts which are introduced. After the yeast has reached maximum growth, the mass is dried and sacked, ready for use.

The inventor claims that his fertilizer contains vitamins and still-living yeast cells, the excess of nutrient salts not used by the yeasts, and the lignin, the latter serving as a valuable soil conditioner.

Science News Letter, February 2, 1946

ZOOLOGY

NATURE RAMBLINGS by Frank Thone

Deputy Forecaster

➤ THE GROUNDHOG, whose shadow-gazing on Candlemas Day (Feb. 2) is supposed to determine the character of the weather for the ensuing six weeks, serves in this country as deputy for the European hedgehog, which was really the original object of the quaint superstition. Early settlers from western Europe, finding no hedgehogs here, picked out the next likeliest animal, which happened to be the groundhog, or as he is also known, the woodchuck.

Actually, the groundhog isn't at all a good substitute for the hedgehog. Zoologically he is not at all closely related, for he is a rodent, whereas the hedgehog is an insectivore, belonging to the same group as moles and shrews. The two animals do not even look much alike: the hedgehog is considerably smaller, and has a back-armor of spines like a porcupine, except that they are only an inch long.

The groundhog would be a most unwilling deputy for the hedgehog if he could be conscious of the dubious honor that has been thrust upon him, for he is a hearty sleeper and hates to get up so early in the year. The hibernating period of the groundhog, over most of his range, runs well into March; St. Patrick's Day would be a much more appropriate feast than Candlemas, to set for his first tentative emergence from winter quarters. The hedgehog, in the much milder winters of western Europe, and especially of the British isles, sleeps lightly and may be seen rummaging around in the underbrush on almost any warm day in winter, like some of our own squirrels.

There is a European animal that is a very close cousin of our American groundhog; it is known as the marmot, which is the more dignified common name of the groundhog as well. It is also the scientific name; the full zoological title of the common groundhog of the eastern United States is *Marmota monax*. A Western marmot, that lives amid the tumbled rocks of the mountains instead of in the woods, is appropriately known as rockchuck instead of woodchuck.

Science News Letter, February 2, 1946

ENGINEERING

Gas Turbines to Give Much More Power

➤ WAR-BORN gas turbine engines can be used in future transport planes and will give nearly half again as much power with the same engine-weight as prewar reciprocating engines, declared R. P. Kroon, Westinghouse engineer, at a meeting of the Institute of Aeronautical Sciences in Washington, D. C. Or, he continued, use of such engines can save approximately 25% of installed engine weight and permit greater fuel capacity for long-range flights, or greater payloads on shorter trips.

These economic advantages, he pointed out, will be achieved through the compactness of the gas turbine, the small diameter and low frontal area of which enable a great amount of power to be packed into a small space with relatively light weight.

"Gas turbine engines," he said, "whether equipped with a propeller drive or depending upon a jet for power, can easily be installed in the wing of a large airliner with a considerable reduction in air resistance as compared with a regular reciprocating engine."

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A blind species of *salamander* is found almost exclusively in Missouri caves.

Like acids, the enzyme *invertin* found in many plants and yeasts changes cane sugar into a mixture of glucose and levulose.

THE SCIENTIST IN ACTION by W. H. GEORGE

A SCIENTIFIC STUDY OF HIS METHODS

This book is for those who need to do ORIGINAL thinking, CLEAR thinking, THINKING WITH A PURPOSE. Helps you to DISCOVER ideas, tells you how to DEVELOP them! Explains clearly METHODS OF WORKING to get RESULTS.

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PHYSICS-BIOLOGY

Atom Bomb Blast Effects

Will probably kill and stun fish in the Bikini lagoon. May also start a local tidal wave to wash over the islands.

➤ ATOMIC BLASTS that will destroy and damage guinea-pig ships in the lagoon of Bikini atoll next May and August will make Friday dinners very cheap for a while. The terrific concussion, even from the bomb that will be exploded in the air, will undoubtedly kill all fish for a considerable area, and stun others for miles around. And when the second bomb is exploded at the surface of the water the effect will be even more severe, because of the absence of any air cushion.

Not only the many-colored tropical fish and sharks will be the victims of the concussion; other sea life on the bottom, such as octopuses and squid, lobsters and crabs, will feel the effects. How much the blast will affect lower types of marine animals, like sponges and coral polyps, will remain a problem until after the event; in general, these humbler forms of animal life can take a terrific battering and then regenerate themselves.

How much effect there will be from the heat released by the explosion is another problematic matter. Very likely, however, only a relatively small volume of water will be turned to steam, for water has a most amazing heat-absorptive power. So while some of the fish may come up ready-cooked, or even overdone, those farther away from the center of explosion will suffer mainly from the blast.

The disputed lingering radioactive effects, much discussed after the explosions in New Mexico and Japan, will mean less in Bikini lagoon. Some radioactive properties will undoubtedly be imparted to the water and the salts dissolved in it, but it is unlikely to last long: water flows away too soon, and becomes too mixed with unaffected water masses out of range at the moment of the explosion.

The blasts, of course, are likely to kick up quite a commotion in the 20-by-30-mile, saucer-like body of shallow water within the ring of the score or so of islands that constitute Bikini atoll. It is highly probable that one or more local tidal waves may be sent washing over the low islands, which are never more than a few feet above hightide mark, doing the same kind of damage that is wrought by an earthquake wave, though less than is done by the longer violence of waves driven by a typhoon. Direct effect of the blast on the vegetation and land life of the islands will of course depend largely on how far off shore the bomb explosions take place.

A group of biologists, particularly marine biologists, are to be included in the scientific party that will be sent to study the effects of the bombs. They will not only record data on destruction to marine life but will probably be able to reap an incidental harvest of specimens otherwise hard to get, which may be killed and dislodged from their homes among the coral by the volcanic violence of the blasts. Follow up studies, on both marine and land life, will be carried on for many months.

Science News Letter, February 2, 1946

Land released from growing feed for horses and other work animals, now replaced by motor power, is sufficient to feed 18,000,000 head of cattle.

Narcissus fly larvae are killed by a new Dutch process in which the infected bulbs are subjected to pressure in a mixture of carbon dioxide and oxygen.

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• Books of the Week •

AMERICAN NATIONAL RED CROSS; Annual Report for the Year Ending June 30, 1945—*American National Red Cross*, 209 p., charts, free. A record of the accomplishments of what may well be the outstanding year in the whole history of the organization.

THE CHEMISTRY OF ANESTHESIA—John Adriani, M.D.—*Charles C. Thomas*, 502 p., diagrs., $7. Deals with the inorganic chemistry related to anesthesia, the organic chemistry of depressant drugs, and the biochemical aspects of anesthesia, including the chemical changes in tissues induced by the administration of anesthetic drugs to man and animals.

HEALTH GUIDES AND GUARDS—Francis P. Wall and Louis D. Zeidberg—*Prentice-Hall*, 392 p., illus., $3.67. 3rd edition. The principles of hygiene presented in a concise and practical manner; corrects popular fallacies and explains accepted facts of health.

HOWELL'S TEXTBOOK OF PHYSIOLOGY—John F. Fulton, ed.—*W. B. Saunders*, 1304 p., illus. and charts, $8. 15th ed. In this 15th edition of a famous textbook, many new chapters have been added and others have been rewritten by the editor.

THE LITTLE FISHERMAN—Margaret Wise Brown—*William R. Scott*, 32 p., illus., $1.50. A book for children charmingly illustrated by Dahlov Ipcar. An accurate description of deep sea fishing as well as a delightful fantasy.

MATHEMATICAL CUNEIFORM TEXTS—O. Neugebauer and A. Sachs—*American Oriental Society*, 226 p., diagrs. and plates, $5. Devoted to the editing of hitherto unpublished Babylonian mathematical texts chiefly from American collections. American Oriental Series, Vol. 29.

MOLLUSCA OF THE TERTIARY FORMATIONS OF NORTHEASTERN MEXICO—Julia Gardner—*Geological Society of America*, 332 p., illus. and charts, $3.25. Geological Society of America, Memoir 11.

PAPERS OF THE MICHIGAN ACADEMY OF ARTS AND SCIENCES: Vol. XXX, 1944—Eugene S. McCartney and Henry Van Der Schalie, editors—*Univ. of Michigan Press*, 684 p., charts and illus., $5. Papers on specialized fields in botany, forestry, zoology, geography, geology, anthropology, economics, literature, medicine and sociology.

PLANNING FOR JOBS—Lyle Fitch and Horace Taylor—*Blakiston* 463 p., charts, $3.75. The suggestions submitted in the employment plan contest sponsored by the Pabst Brewing Co. Material covers a wide range of views from a group of writers which includes some of America's most distinguished businessmen and economists.

PRIMITIVE MONEY—H. A. Wieschhoff—*Univ. of Pennsylvania*, 43 p., illus., 50 cents. Description of monetary concepts as shown in primitive forms of currency. University Museum Bulletin, Vol. 11, No. 3.

PROTOZOOLOGY—Richard R. Kudo—*Charles C. Thomas*, 778 p., illus., $8, 3rd ed. A textbook presenting comprehensive and up-to-date information on the common and representative genera and species of all groups of both free-living and parasitic protozoa.

THE PUEBLO INDIAN WORLD—Edgar L. Hewett and Bertha P. Dutton—*Univ. of New Mexico Press*, 176 p., illus., $4. Studies on the natural history of the Rio Grande valley in relation to Pueblo Indian culture. Handbook of Archaeological History, No. 6.

RADIO TEST INSTRUMENTS—Rufus P. Turner—*Ziff-Davis*, 219 p., diagrs. and illus., $4.50. Technical, fully illustrated descriptions.

REVISION OF THE UPPER CAMBRIAN FAUNAS OF NEW JERSEY—B. F. Howell—*Geological Society of America*, 46 p., illus., 85 cents. Geological Society of America, Memoir 12.

WARRIORS WITHOUT WEAPONS: A Study of the Society and Personality Development of the Pine Ridge Sioux—Gordon Macgregor—*Univ. of Chicago Press*, 228 p., illus., $3.75. What the decline of the Sioux Indians has meant to the Indian children. Attempts to find out why these children are what they are and what can be done to help them take their place in our democracy.

Science News Letter, February 2, 1946

ENGINEERING

Sea-Level Channel Urged for Panama Canal

➤ LOCKS AND DAMS of the present Panama canal are its parts vulnerable to enemy bombing, and the canal should now be a lock-less, dam-less sea-level cut across the Isthmus, John G. Claybourn, Panama Canal engineer, reported to the American Society of Civil Engineers in New York. This was recommended by a majority of the engineers on the commission which studied the project in 1905-06.

Mr. Claybourn is superintendent of the Panama Canal's dredging division and has been associated with the canal since 1910. The proposed sea-level canal, he said, would have no dams or locks other than readily-reparable underwater tidal locks. The reconversion to the sea-level channel could be accomplished most economically by doing the work now, simultaneously with the resumption of the construction of the third set of locks authorized by Congress in 1939 and interrupted by the war.

Only half the channel would be excavated an additional 30 feet of depth at a time, he said, and when the work was completed, the channel would be 500 feet wide and of an average depth of 55 feet.

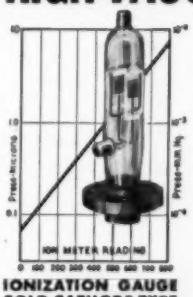
Mr. Claybourn pointed to the Suez Canal as proof of the superiority of a sea-level route over the American lock and dam structure. The Suez, he stated, passed the largest ships efficiently, at low cost, and with practically no hazard. It was blocked by sunken vessels during the war but only for days. Its effectiveness as a world-wide waterway has been demonstrated, Mr. Claybourn said, with channels less than half the minimum recommended for Panama at sea level.

"Authoritative statements have been made by high officials of the Government that the present lock canal cannot be protected against bombing," Mr. Claybourn continued. "These statements were made before the advent of the atomic bomb. With this instrument of devastation, destruction of our control works would be infinitely greater, resulting in the disintegration of structures and even removing the possibility of making repairs, as might be possible with ordinary bombing."

Science News Letter, February 2, 1946

Sulfur dusts distributed from airplanes to control certain potato diseases are best applied early or late in the day; heat waves arise from the plants during the midday and prevent the dusts from settling on the foliage.

HIGH VACUUM GAUGES



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•New Machines and Gadgets•

⚙ *SHEET MUSIC turner resembles the ordinary music standard but has an arm pivoted on its head provided with a sheet gripper, a foot-operated lever, and a pivoted T bar movable to two positions. A slight pressure of the foot operates the T bar which engages the gripper device and turns the page.*

Science News Letter, February 2, 1946

⚙ *ANTI-VIBRATION mounting unit, suitable for suspending radar and other delicate equipment in airplanes and in other places, effectively absorbs vibration in more than one direction. A stainless steel spring of special design with three-way freedom of movement carries the principal load.*

Science News Letter, February 2, 1946

⚙ *TRICYCLE, recently patented, is operated either by foot or hand, or by both at the same time. One chain drive connects conventional foot pedals with a sprocket on the front wheel, and another connects hand grips, which replace the ordinary tricycle handlebar, with another sprocket on the same wheel.*

Science News Letter, February 2, 1946

⚙ *MOTION PICTURES for airplane passengers are provided by a light modified 16-millimeter projector, special amplifiers, and standard speakers mounted in the cabin's ceiling. Projector is shock-mounted on a stand near the rear of the cabin, as shown in the picture. A vibrationless screen is at the front.*

Science News Letter, February 2, 1946

⚙ *WRENCH, recently patented, has a movable jaw that is automatically locked in place when merely pushed against the nut to be turned. Thin plates within the base of the jaw make a firm pinching engagement with the shank of the wrench. Thumb pressure on a tab projecting from one plate releases the grip.*

Science News Letter, February 2, 1946

⚙ *TABLET BOX, with rounded corners, has a flat top pivoted at its center so that it can be turned. Semi-circular pieces are cut out of the middle of the two shorter edges of the cover, which, when properly positioned with the rounded box corners, form circular openings through which the tablets can be dispensed, one at a time.*

Science News Letter, February 2, 1946

⚙ *STATIC ELIMINATOR, to remove static electricity developed by machines and other industrial processes, is a specially designed housing containing radioactive foil which emits alpha rays in a controlled direction. By ionizing the air, the rays make it an electrical conductor.*

Science News Letter, February 2, 1946

If you want more information on the new things described here, send a three-cent stamp to SCIENCE NEWS LETTER, *1719 N St., N. W., Washington 6, D. C., and ask for Gadget Bulletin 296.*

Question Box

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Why is the German wind tunnel, now in the United States, of unusual interest? p. 73.

AERONAUTICS

What plane has set a new endurance record? p. 72.

BIOCHEMISTRY

What new source of vitamins is seen as a possibility? p. 72.

CHEMISTRY

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FISHERIES

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GENERAL SCIENCE-EDUCATION

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METEOROLOGY

How was data on position, course, etc. of typhoons obtained during the war? p. 76.

PHYSICS-BOTANY

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Where published sources are used they are cited.

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